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L22: Entry 33 of 51 File: USPT Jan 1, 2002

US-PAT-NO: 6336103

DOCUMENT-IDENTIFIER: US 6336103 B1

TITLE: Rapid method of analysis for correlation of asset return to future financial liabilities

DATE-ISSUED: January 1, 2002

INVENTOR-INFORMATION:

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US-CL-ISSUED: 705/36; 705/35

US-CL-CURRENT: 705/36; 705/35

FIELD-OF-SEARCH: 364/408, 705/35, 705/36

PRIOR-ART-DISCLOSED:

U.S. PATENT DOCUMENTS

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PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
3581072	May 1971	Nymeyer	
4194242	March 1980	Robbins	
4232367	November 1980	Youden et al.	
4321672	March 1982	Braun et al.	
4346442	August 1982	Musmanno	
4376978	March 1983	Musmanno	
4597046	June 1986	Musmanno et al.	
4642768	February 1987	Roberts	
4648038	March 1987	Roberts et al.	
4722055	January 1988	Roberts	
4736294	April 1988	Gill et al.	

☐	4739478	April 1988	Roberts et al.	
☐	4742457	May 1988	Leon et al.	
☐	4752877	June 1988	Roberts et al.	
☐	5761442	June 1998	Barr et al.	705/36
☐	5806047	September 1998	Hackel et al.	705/36
☐	5884287	March 1999	Edesess	705/36
☐	5946667	August 1999	Tull, Jr. et al.	705/36
☐	6003018	December 1999	Michaud et al.	705/36
☐	6078904	June 2000	Rebane	705/36

FOREIGN PATENT DOCUMENTS

FOREIGN-PAT-NO	PUBN-DATE	COUNTRY	US-CL
WO-91/02326	February 1991	WO	
WO-00/16225	March 2000	WO	

OTHER PUBLICATIONS

Leibowitz et al: "Portfolio Optimization with Shortfall Constraints: A Confidence-Limit Approach to Managing Downside Risk"; Financial Analysis Journal, Mar./Apr. 1989, vol. 45, No. 2, pp. 34-41 (Abstract Only).*
"The Movements of Interest Rates, Bond Yields and Stock Prices in the United States Since 1956", F.R. Macaulay, Natl. Bureau of Economics Research, N.Y. 1938.
"The Interest Rate Assumption and the Maturity Structure of the Assets of a Life Insurance Company", I.T. Vanderhoof, Reprinted from the Transactions of the Society of Acturaries, vol. XXIV, Meetings No. 69A and 69B,May and Jun. 1972.
"Duration as a Practical Tool for Bond Management", R.W. McEnally, J. of Portfolio Management, Summer 1977.
"The Revolution in Techniques for Managing Bond Portfolios", The Institute of Chartered Financial Analysts, Copyright 1983 by the Institute of Chartered Financial Analysts, Feb. 3, 1984.
"Matched-Funding Techniques-The Dedicated Bond Portfolio in Pension Funds", M.L. Leibowitz, Salomon Brothers Inc., Bond Portfolio Analysis Group, Feb. 1985.
"Understanding Duration and Volatility", R.W. Kopprasch, Ph.D., Salomon Brothers Inc, Sep. 1985,
"Total Portfolio Duration--A New Perspective on Asset Allocation", M.L. Leibowitz, Solomon Brothers Inc., Bond Portfolio Analysis Group, Feb. 1986.
"Liability Returns--A New Perspective on Asset Allocation", M.L. Leibowitz, Solomon Brothers Inc., Bond Portfolio Analysis Group, May 1986.
"The Term Structure of Interst Rates and its use in Asset and Liability Management", A.L. Toeves, L. Dyer, Oct. 1986.
"Measuring the Effective Duration of Pension Liabilities", T.C. Langetieg, L.N. Bader, M.L. Leibowitz, A. Weinberger, Salomon Brothers Inc., Bond Portfolio Analysis Group, Nov. 1986.
Volatility of Pension Expense Under FASB Statement 87, L.N. Bader, M.L. Leibowitz, Salomon Brothers Inc., Bond Portfolio Analysis Group, Dec. 1986.
"Bond Dedication Within the New Asset Allocation Framework", M.L. Leibowitz, L.N. Bader, Salomon Brothers Inc., Bond Portfolio Analysis Group, Feb. 1987.
FASB Statement No. 87: Investment Management Implications, J.A. Corkran, First Boston, Apr. 1987.
"Portfolio Optimization Within a Surplus Framework--A New Perspective on Asset

Allocation", M.L. Leibowitz, R.D. Henriksson, Salomon Brothers Inc., Bond Portfolio Analysis Group, Apr. 1987.
"Surplus Insurance: In Search of the Liability Asset", R. Bookstaber, J. Gold, Morgan Stanley, May 1987.
"The Financial Executive's Guide to Pension Plans", L.N. Bader, M.L. Leibowitz, Salomon Brothers Inc., Bond Portfolio Analysis Group, May 1987.
"The Right Way to Manage Your Pension Fund", R.D. Arnott, P.L. Bernstein, Reprinted from Harvard Business Review, Jan.-Feb. 1988.
"Reappraising the Asset Allocation Decison", M.L. Leibowitz, R.D. Arnott, L.N. Bader, R.D. Henriksson, Salomon Brothers Inc., Bond Portfolio Analysis Group, Nov. 1987.
"Modern Investment Theory", R.A. Haugen, Prentice Hall, Englewood Cliffs, N.J. 1986.

ART-UNIT: 2161

PRIMARY-EXAMINER: Cosimano; Edward R.

ATTY-AGENT-FIRM: Reinhart, Boerner, Van Deuren, Norris & Rieselbach, s.c.

ABSTRACT:

A method and system for correlating an expected asset return of a portfolio to changes in future financial liabilities and also to other financial indices. Management of asset portfolios often requires precise matching of liability streams, such as is the insurance industry and for pension funds. The method selects the weight percentages of assets by achieving optimum statistical correlation between asset returns and liability returns.

11 Claims, 10 Drawing figures

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L22: Entry 33 of 51 File: USPT Jan 1, 2002

DOCUMENT-IDENTIFIER: US 6336103 B1
TITLE: Rapid method of analysis for correlation of asset return to future financial liabilities

Abstract Text (1):
A method and system for correlating an expected asset return of a portfolio to changes in future financial liabilities and also to other financial indices. Management of asset portfolios often requires precise matching of liability streams, such as is the insurance industry and for pension funds. The method selects the weight percentages of assets by achieving optimum statistical correlation between asset returns and liability returns.

Brief Summary Text (1):
The present invention is related generally to a method and system for selecting a portfolio of assets for achieving optimum correlation of asset return to a selected standard financial index. More particularly, the invention is related to a highly efficient, rapid method and system for choosing an asset portfolio having the optimum correlation of the asset return to a time dependent financial index, such as a financial liability, at each of a number of selectable asset return levels.

Brief Summary Text (2):
Management of portfolios of assets has historically emphasized maximizing the return on assets with the objective of at least outperforming the market. However, in some financial industries the objective, or the figure of merit, is also related to meeting future liabilities rather than just achieving high return on assets. Frequently, an institution will have a future intended use of the assets which requires their availability at some future time. If assets are performing differently than liability requirements, substantial financial hardship can result. For example, insurance companies and corporate pension plans have well defined future financial liabilities which must be met. Consequently, although return on assets is one important objective, meeting future liabilities is also important and can be even more important in many instances. In fact, many pension plan managers are now required to meet the standards set forth in FASB Statement 87 (Financial Accounting Standards Board) on pension fund accounting. Under the FASB Statement a market interest rate return on pension funds is the standard index and is to be based on A-rated ten year corporate bonds. Under this FASB Statement any deficit in corporate pension funds are now reflected on the balance sheet. Any such deficit would therefore have substantial adverse effect on the apparent net worth of the subject corporation. Consequently, this FASB Statement standard strongly encourages maintenance of a surplus for a pension fund. As an example of the importance of matching the liability requirements under the FASB Statement, consider the percentage change possible for pension plan liabilities, as measured by the accumulated benefit obligation (ABO). If, for example, interest rates increase by 1% in one year over the present rates, the present value of the ABO would decline by 10% if the ABO has a duration of 10 years. Likewise, if interest rates were to drop by 1% in one year, the present value of the ABO would increase by 10%. The potential for such dramatic fluctuations in liabilities clearly deserves careful attention by parties obligated to meet future liability streams.

Brief Summary Text (4):

The "immunization" method of meeting future financial liabilities uses bonds having substantially the same duration as the liability stream. Duration is a measure of volatility expressed in years, which is similar to, but more precise than, average life. The duration is calculated as the weighted average amount of time to the receipt of the payout. There are however significant drawbacks to "immunization", with one primary disadvantage being the relatively low excess return on assets generally achieved by the method. Additional limitations are imposed by the two major assumptions made by the strategy: The yield curve (a plot of yield to maturity on bonds versus their time to maturity) will only make parallel shifts. Consequently, regardless of maturity, when market conditions change, all bonds allegedly move exactly the same amount in yield. This clearly is not the case since there have been substantial inconsistencies in the past for the difference in rates for short-term bonds and long-term bonds. Secondly, all cash flows in excess of required annual payments can allegedly be reinvested at the yield to maturity of the portfolio. This presumption is also clearly not true since sharply declining or rising interest rate environments will make it extremely difficult to carry out reinvestment. Furthermore, this strategy does require more ongoing management of the portfolio in order to sell or buy more securities to match the actuarial schedule and maintain a proper asset/liability match.

Brief Summary Text (5):
The "cash matching" method utilizes a bond portfolio having numerous component bonds with various maturity dates and payout rates to precisely match the liability requirements of the pension plan. Such an approach has the same primary disadvantage as the "immunization" method and further requires additional effort to assemble the portfolio. Frequently, the "cash matching" method demands payment of a premium to achieve the correct mix of bond rates and maturity. Both of the first strategies ("immunization" and "cash matching") must invest in fixed income securities to provide the assurance of receiving the necessary cash flows. In fact, they must primarily invest in U.S. treasury obligations since investments in corporate or mortgage securities increase the chance for default or for call risks which can have the effect of changing the projected cash flow.

Brief Summary Text (6):
Pension plan liabilities or other future liabilities, such as are present in the insurance industry, are long term in nature. Therefore, a future liability stream can greatly benefit from the compounding effect of investment in higher returning assets, such as common stocks. However, attempts to characterize stocks in terms of a time duration parameter or otherwise have not been successful. In the last few years many unsuccessful attempts have been made to develop a system whereby a portfolio of equities is linearly optimized relative to a liability stream. There have been attempts to parallel the "cash matching" techniques with the use of stocks, instead of bonds. This approach has involved matching the expected dividend flow of the portfolio to the liability stream. Unfortunately, stock dividend yields are unpredictable, particularly beyond 3 years in the future. Another major effort in equities has been directed to an "immunization" type treatment. In this effort an attempt was made to calculate the duration of stocks on an individual basis, as well as on a portfolio basis; but these attempts also have been unsuccessful, primarily due to the long term unpredictability of stock dividends.

Brief Summary Text (7):
In a related patent application, incorporated by reference herein and having U.S. Ser. No. 281,560 and filed Dec. 8, 1988, now abandoned an improved method and system were set forth directed to correlating return on assets to a financial objective over time. In performing the analysis to determine the optimum assets of a portfolio to track the financial objective, the machine time and efficiency of the evaluation process can limit the number of assets considered in constructing the portfolio. Such limitations on the number of assets which are considered for inclusion in the optimum portfolio can also limit the performance of the selected portfolio.

Brief Summary Text (8):
It is therefore an object of the invention to provide an improved method and system for determining the optimum portfolio of assets for tracking a financial index.

Brief Summary Text (9):
It is another object of the invention to provide a new method and system of efficiently selecting the optimum portfolio of assets for tracking a financial index.

Brief Summary Text (10):
It is an additional object of the invention to provide an improved method and system of rapidly analyzing a large number of potential assets to select the optimum portfolio of assets to track a financial index.

Brief Summary Text (11):
It is a further object to provide a new method and system of enlarging the number of potential assets under consideration for inclusion in a portfolio of assets, while reducing the time required to select the portfolio of assets which best track the behavior of a financial index.

Brief Summary Text (12):
It is another object of the invention to provide a rapid, more efficient method and system of selecting the weighted values for assets selected from a universe of possible assets for a portfolio designed to track a financial index.

Brief Summary Text (13):
It is an additional object of the invention to provide an improved method and system for reinvesting cash flow from a portfolio starting with that current portfolio of assets.

Drawing Description Text (2):
FIG. 1A is a functional flow chart illustrating operation of one method of portfolio construction and

Drawing Description Text (8):
FIG. 4 a comparative plot of cumulative funding status for simulation results over time for a pension plan liabilities (dashed), a portfolio derived by a preferred method of the invention (solid line) and the Standard & Poors 500 index (dashed and dotted);

Detailed Description Text (2):
Broadly stated, a method and system are described for selecting a portfolio of assets and correlating a future asset return of the portfolio to a financial index, such as, a liability index, an inflation index, or any other accepted index and mixtures thereof. Specific examples of indices are liability indices, such as, individual corporate pension plan liabilities and insurance company liabilities. The consumer price index and wage growth index are examples of an inflation index, and other indices can include accepted stock price indices and futures markets indices. The method includes selecting asset portfolios which optimally correlate portfolio returns to the future desired payouts or payments needed over time to fulfill the desired financial objective. In the general case the user selects a standard index to which optimum correlation is desired for the selected portfolio having a future asset return over time. The process of selecting the standard index can involve obtaining input (such as actuarial) in terms of the characteristics of future cash payments discounted to present value based on a range of discount rate and wage (inflation) values. This information can be used to construct a functional behavior for the present value of the liability. A decision is then made, such as by a company pension fund manager, that certain discount rates and inflation assumptions should be made. On this basis the current liabilities are projected

back in time using these assumptions and a plurality of assets are examined to determine their sensitivity to the past behavior of the liability returns. In the most general sense if one can determine an index to which a portfolio of assets has a strong correlation, this sensitivity can be used to select a set of assets which will match the behavior of the index as it changes over time. As a particular example an actuary can provide specific ranges of present value liability for a range of discount rates and inflation rates. The change over time of the liability from month to month over a twenty four month period can yield a liability return. The analysis to be described in more detail hereinafter determines which selected ones of a plurality of assets track the liability returns with best correlation. The resulting weighted set of assets form the portfolio to follow the future liability returns. An analysis using the selected standard index can be performed on a plurality of assets, such as, for example, at least one of the following categories of assets: stock securities, real estate investments, futures contracts, options, commodities, currencies and precious metals. The analysis allows the identification of the combination of weight percentages of selected ones of the plurality of assets yielding the optimum correlation of the future asset return to the standard index. Optimum correlation is thus achieved by calculating a minimum standard deviation or a variance for the difference between the return of the portfolio of assets and the selected standard index return. This method and system are particularly applicable for, but not limited to, the insurance industry and management of pension fund liabilities.

Detailed Description Text (3):
FIGS. 1A and 1B illustrate in functional flow charts the procedures followed in carrying out two forms of the invention. In the first method shown in FIG. 1A (and described previously in pending application having U.S. Ser. No. 281,560, now abandoned) the correlation of the expected asset return of a portfolio to a standard index one is initiated by input of various basic information. This information includes, for example, establishing the fundamental statistical characteristics of liability returns, and future payment schedules for matching a desired index, such as the future stream of financial liabilities of a pension plan. As described hereinbefore, the future payment schedule for a pension plan can be determined by using actuarial data. These future liabilities can be characterized in terms of an accumulated benefit obligation (ABO), that is, the price you would have to pay if the liabilities were sold at a selected time. The total outlay required to pay retirement wages for the pension plan are discounted back to the present value at the market rate interest (currently 10%). Other related characterizations can be used, such as a projected benefit obligation (PBO), by accounting for inflation in the growth of wages at retirement. This amount is converted to a percentage and an expected salary at retirement, discounted to present value. Therefore, although the ABO is affected primarily by interest rates, additional standard measures, such as the PBO, account for inflation. Therefore, the method is also generally effective for calculating the convolution of complex effects with one another. The method only requires optimizing correlation of the time behavioral performance of future asset return relative to the particular standard index, which includes any conceivable selected characteristic which assets are found to be sensitive to.

Detailed Description Text (4):
In the manner illustrated in step 1, box 21, of FIG. 1A, various input files are therefore created to begin the analysis. These input files can include, for example, asset return information for the universe or plurality of assets to be sampled in the analysis. Also established as data files are the data representative of the standard asset return over time, such as target returns for a future liability stream of a pension plan or an insurance company. The future liability stream can depend on interest rates and/or inflation rates and other variables which can affect the liability stream. For example, as described hereinbefore, a surface can be generated which describes the behavior of liability return as a function of both interest rates and inflation rates. Other information in the data

files can be identification information for the plurality of assets, current price and market capitalization of the assets, as well as the characteristic weight percentages of assets in a previously selected portfolio. Weight percentages, for example, from a prior period would be used in the most preferred embodiment.

Detailed Description Text (6):
The method in FIG. 1A then, in box 23, initializes information preparatory to analyzing the plurality of assets, such as, establishing names of securities, associated identifier information, industry codes, prices of securities, market capitalization, weight and percent of the previously calculated prior portfolio, the period for the asset return, the name of the target or standard for measuring a standard asset return and the time period for the standard returns.

Detailed Description Text (7):
In the next box 24 in FIG. 1A the correlation between the future asset return and the standard index is optimized by first generating a covariance array. While other nonlinear statistical analyses are possible, this method being described is a preferred method of carrying out the analysis. For example, another useful statistical method of analysis is correlation parameterization which is embodied in the computer software program Appendix III. As shown in the next step, box 25, in FIG. 1A, the average return of each security is calculated followed by imposing certain constraints on the calculation, box 26, such as setting a range of weight percentages to be tried. The calculation is then implemented to a solution by a standard computer program quadratic technique (see Appendix I), boxes 27 and 28. This step is then followed by determination, box 29, of various statistical parameters, such as a and B, standard error, portfolio returns over various time periods and for selected weights. The analysis is then completed, box 30, by printing output see attachment to Appendix I) such as asset weights, sensitivity factors for selected assets of the portfolio, statistical parameters, sorted buy and sell orders and sector weights.

Detailed Description Text (8):
A simple example of utilizing the preferred statistical method is illustrated for a portfolio containing three stocks (designated 1, 2, and 3). In order to find the optimum weight percent for each of the three stocks in the portfolio, the minimum standard deviation (square root of variance) is calculated for the differences between the assets of the portfolio and the future liabilities as represented by the standard asset return over time. The risk is therefore defined as the standard deviation of differences: ##EQU1##

Detailed Description Text (10):
R.sub.pi =total return on the portfolio during period i;

Detailed Description Text (13):
R.sub.p =average return on portfolio, i=1,n; and

Detailed Description Text (14):
R.sub.T =average return on target or standard portfolio of assets,

Detailed Description Text (16):
The portfolio return equals percentage weight for each stock times the return on that stock: ##EQU2##

Detailed Description Text (17):
x.sub.j =the weight in the portfolio of the stock j

Detailed Description Text (20):
Making this substitution, a determination of risk in the manner set forth above results in the calculation of the covariance of the stock with each of the other stocks in the portfolio after subtracting the return of the target, or standard

index, from the future asset return of each stock.

Detailed Description Text (24):
In order to minimize this "risk" function, we determine the combination of weight percentages for stocks 1 thru 3 which produces the smallest statistical risk. The above described risk can readily be calculated by various means, such as, by a computer program (which is included in Appendix I). The output (see attachment to Appendix I) of the calculation includes the weight percent of each stock and the associated overall risk level. This calculation can be repeated for a range of expected asset return levels and results in generating a nonlinear type "bullet" shape defining the limits of minimum risk over a range of asset return levels for associated standard deviations of funding level (see FIG. 6). The method uses historical returns for the plurality of stocks analyzed in order to calculate the resulting covariance between the standard liability returns and the future returns of the potential portfolio of assets. Appendix II illustrates an example of a computer program for calculating typical liability return data. The method of analysis results in choosing a selected set of assets for the portfolio with a strong inclination of the selected set of assets to respond in a manner such as the standard asset returns over time, which alone can be valuable output. As mentioned hereinbefore, in other embodiments, the nonlinear analysis of a plurality of assets can involve other methods, such as, index correlation parametrization for matching the performance of a target index return (see Appendix III).

Detailed Description Text (30):
If a portfolio is to be constructed for tracking a specific financial target index, the returns to that target for the relevant period are read into memory arrays. Additional identifying information is also read in from the target data file.

Detailed Description Text (31):
Set-up Constraints on Upper and Lower Bounds in Terms of Percent of Portfolio for each Security and each Sector or Industry.

Detailed Description Text (32):
In box 43, the method defines variance as the sum of squared difference between portfolio returns and the target and generate return series for the largest in terms of all assets in the portfolio. Constraints are generated as security type sector type individual security rights. A maximum and minimum percentage weight of the portfolio for each security can be specified to constrain the portfolio. This can be used to insure portfolio diversification and to control costs associated with trading. In addition, sectors of the universe, for example, utility stock, can be constrained by maximum and minimum boundaries. If one has a single target, one can "short" a stock and take a negative minimum position.

Detailed Description Text (34):
If a target is used, the covariance is calculated for each security and stored in an array. If no target index is used, a zero value for each security is stored in the array.

Detailed Description Text (35):
Create an Initial Portfolio by Selecting Highest Covariance Securities and Weighting Them at their Upper Limits as Defined by Selected Constraints.

Detailed Description Text (36):
This step, box 36, creates an initial feasible solution to the problem by filling the vector of portfolio weights according to the constraints and in order of highest covariance.

Detailed Description Text (37):
Calculate the Objective Function Value at Initial Portfolio Weightings, box 37.

Detailed Description Text (38):
The objective function can be defined in a number of ways. The computer program allows monthly or moving quarterly returns to be used for optimization. Transaction costs can be considered and their importance magnified or reduced relative to other objectives. With minor changes, other such goals can be incorporated into the objective function. The key is that once the objective function is specified, partial derivatives can be used to guide the search for an optimal portfolio. Any example of a preference that can be created is an increased weighting for a stock with a likely dividend versus one with no dividend.

Detailed Description Text (39):
Calculate Partial Derivatives For Each Security at Initial Portfolio Weightings.

Detailed Description Text (40):
A partial derivative is calculated, box 37, for each variable (in this case each security), and a direction can be determined in which to move the individual security weights in order to obtain an improved portfolio solution. The partial derivatives are also used to determine if the weights are optimal. In the prior art, the solution techniques require storage of a full covariance matrix array. This storage requirement has limited the practical number of securities which could be considered at one time in the past methodologies. Indeed, the storage requirements, and to a large degree the processing time, varies as the square of the number of securities in the portfolio under consideration. See the example discussed hereinafter in which the previous methodology is compared to the invention.

Detailed Description Text (41):
In addition, the methods of solution for these problems in the prior art were slow and cumbersome and subject to failure when the full covariance array was sensitive or a nonunique set of solutions were achievable. This current method requires much less storage, uses a rapid solution technique and allows control of the tolerance used for optimality. Consequently, the improved methods will select a portfolio when several combinations are equally desirable.

Detailed Description Text (42):
Not only is the amount of necessary memory reduced and the computer calculational time greatly reduced, there is substantial flexibility in defining the objective, assurance of the solution is enhanced and simultaneous considerations of large number of securities allows substantial improvement in optimizing the expected return of the portfolio compared to the target index.

Detailed Description Text (43):
Change of Portfolio Weightings by Moving in Direction of Improvement is Indicated by Partial Derivatives, box 39.

Detailed Description Text (44):
Adjustment of the portfolio weights is achieved by a search technique which moves along the constraints and changes in a proper direction of improvement of the objective function. The objective function is calculated at the new weights and a test of improvement is made.

Detailed Description Text (46):
If the objective function is not improving or if the step size used to adjust the portfolio weights becomes extremely small, the search is terminated. This solution is normally a Kuhn-Tucker point (conventional method of establishing optimality conditions) or extremely close thereto within an acceptable epsilon to such a point.

Detailed Description Text (48):
If the termination conditions are not satisfied, then, in box 40, one re-calculates

the objective function value, re-calculates the partial derivatives, makes changes in the portfolio weightings to achieve an improved solution and test for convergence.

Detailed Description Text (51):
Relevant portfolio information is output, box 41, with security weightings, objective function values, purchases and sales necessary to achieve the optimum portfolio and industry weightings.

Detailed Description Text (53):
Included in Appendix IV is an exemplary computer software (source output) program illustrating critical steps of the method of FIG. 1B. Table XI shows exemplary results for a program simulation wherein the target index is the Standard and Poors 500 stock index. Appendix VI illustrates significant distinctions from the optimizer methodology used in the copending patent application having U.S. Ser. No. 281,560, now abandoned.

Detailed Description Text (55):
A test was performed on an IBM compatible PC to compare the solution speeds of two portfolio optimization systems. In a prior system, the problem of handling large numbers of securities in a portfolio selection process increased in proportion to the number of securities squared. Thus, a problem involving one hundred securities would take approximately one hundred times as many calculations to solve as a problem with ten securities.

Detailed Description Text (60):
3% portfolio weight upper bound on each security

Detailed Description Text (61):
0% portfolio weight lower bound on each security

Detailed Description Text (68):
Circumstances arise regularly in the investment field which rapidly change the prospects for securities. The impact of these sudden changes must be incorporated into the security valuation system so that rational alternations in the investment portfolios may be made.

Detailed Description Text (69):
Examples of sudden changes include: a company is presented with a buy-out offer by another firm; a disaster occurs, such as an oil spill, which may impact a firm's stock price; monetary or fiscal policy changes are implemented by the government. It is important for an investment system to be flexible and fast enough to evaluate the impact these changes may have on a security portfolio.

Detailed Description Text (70):
The current system allows for estimates of partial monthly returns to be calculated on any day of the month, for these returns to be used in the optimization process, and for the results of the analysis to be completed within a few minutes.

Detailed Description Text (71):
One advantage of the current system is that analysis of the current investment opportunities can be completed rapidly and recommendations for buying and selling securities can be quickly generated. This allows investment decisions to be made and implemented quickly with confidence.

Detailed Description Text (72):
Further illustrations of the invention are exemplified by various historical simulations shown in FIGS. 2A, 2B, 3A, 3B and 4 Tables I-III which are taken over the time period of 1975 to 1987. As listed in Table I and in FIGS. 2A, 2B, 3A and 3B the liability stream for a selected pension plan can undergo substantial

variation with time. A portfolio of assets has been analyzed in accordance with the preferred statistical method described hereinbefore, and details of the selected portfolio are set forth in Tables IV-X. Over the 1975-1987 time period, the resulting portfolio of assets shows substantially better correlation to the liability stream as compared to the Standard & Poors 500 return. Moreover, as seen in Table II and FIG. 4, the overall cumulative return for the portfolio of assets selected by the preferred method is far better than the Standard & Poors 500. The greatly enhanced stability and good

Detailed Description Text (73):
statistical correlation with the liability return is further evident in Table III and FIGS. 5A and 5B, wherein detailed comparisons are made between the selected portfolio of assets and the standard liability return.

Detailed Description Text (74):
In FIG. 6 a range of simulation funding returns for the portfolio of assets are compared with a typical pension fund a mixture of stocks, bonds, real estate and treasury bills. Clearly, the risk is much higher for the typical pension fund; and dramatic improvement in the return, or reduction of risk, results when only 35% of the standard pension fund is modified using the method of the invention.

Detailed Description Text (75):
In another embodiment, a portfolio of assets can be constructed by selecting a portion of a total portfolio with assets having optimal correlation of asset return to a liability or financial index. The remainder of the portfolio comprises futures contracts which are combined with the correlated portfolio portion to achieve in effect an optimum correlation for the entire portfolio of assets. Further details are set forth in Appendix IV.

Detailed Description Text (76):
In another aspect of one embodiment, control can be exerted over pension plan surplus by adjusting the level of risk selected for a portfolio of assets. As illustrated in FIG. 6, the expected return can be selected at various levels with the degree of risk, or standard deviation of the funding level, generally increasing as one moves from a position of minimum risk at the top of the "bullet" to higher future returns. Control over a pension plan surplus, or for that matter any plan for which you wish to respond dynamically to control risk/return in concert, can be accomplished over a wide range of risk and return values. Such an approach can be used to manage return under variable risk positions and minimize insurance costs for protecting against underfunding of a plan, such as falling below a predetermined minimum floor. Consequently, as the funding level approaches 100% a minimum risk portfolio of assets should be constructed using the methods described hereinbefore. As the surplus accumulates, the acceptable risk level can be increased for the portfolio of assets by dynamic modification of the portfolio asset components. One can utilize futures contracts as an overlay for an underlying portfolio of assets, having been selected by the basic invention described previously, to create in effect an optimum statistical correlation for the entire portfolio, including the futures contracts. As the surplus approaches 10%-20% excess, a portfolio of assets can be constructed resulting in a much higher level of future return. For example, in FIG. 6, the change in future return from minimum risk to the highest return data point is about a 35% greater return but with an accompanying 70%-80% increase in standard deviation compared to the minimum risk point.

Detailed Description Text (82):
Problems that otherwise could not be solved by standard technologies are solved by the current system. This allows practical portfolios to be selected even though there is limited available return information.

Detailed Description Text (83):

In another aspect of the invention involving practical applications of the current methodology to managing security portfolios, the ability to invest dividend income and other cash flows efficiently is also an important element in effective management. The current system allows a portfolio manager to invest available cash in the most efficient securities while considering the current portfolio holdings. Effectively this allows the manager to invest in securities which best enhance the current portfolio position without selling any of the current holdings. In a practical portfolio management system the ability to reinvest cash flows efficiently is always an important consideration. The current system provides this ability. An illustration of a reinvestment solution is provided in Appendix V which lists data used and results obtained in performing the reinvestment method.

Detailed Description Text (84):
In addition to finding optimal portfolios for tracking financial targets, the current system allows other objectives to be considered and incorporated in the solution. Examples include supplementing the basic objective function with an income objective, tax impact objective, or a company cash flow objective. The system is flexible enough to allow the objective function to be customized for particular applications.

Detailed Description Text (85):
As an example, an investor who has a preference for securities with high dividend yields will specify an objective function which explicitly states the trade off between portfolio tracking and dividend income. The computer routine to optimize a portfolio (the optimizer) will extract the partial derivatives of this objective function and proceed to select an optimal portfolio which exactly incorporates the specified trade-off between dividend income and tracking. This investor then has a custom solution which addresses his particular concerns and requirements.

Detailed Description Text (86):
The consideration of transaction costs associated with buying and selling securities is incorporated into the portfolio optimization system to control expenses due to trading. The trade off between tracking accuracy and transaction costs can be specified by the investor. This allows for a customized objective function, with regard to expected transaction costs, for each client.

Detailed Description Text (87):
Investors may also have tax effects to consider when trading from one security to another. The taxable gains and losses and their impact on expected return can be specified by the investor so as to control these costs.

Detailed Description Text (88):
Another preference which can be incorporated into the objective function and handled explicitly by the optimization system is the consideration of cash flows. An investor may have a preference for investing in companies which have large and positive cash flows. This objective can be incorporated into the system and resulting portfolios will reflect this investment goal.

Detailed Description Paragraph Table (2):
TABLE II Spanning Technology Historic Simulation Cumulative Surplus Analysis Spanning Portfolio S&P 500 Index Cumulative Cumulative Cumulative Cumulative Dollar Funded Dollar Funded Year Value Position Value Position $100.00 100.00% $100.00 100.00% 1975 118.78 119.65 127.12 128.05 1976 149.36 140.49 147.26 138.52 1977 133.59 133.82 126.88 127.10 1978 130.14 141.83 125.03 136.25 1979 148.14 177.42 137.62 164.83 1980 157.98 216.50 170.79 234.06 1981 173.32 263.84 152.84 232.66 1982 218.19 267.96 173.99 213.68 1983 256.52 348.87 202.88 275.93 1984 263.48 350.40 205.10 272.76 1985 359.74 403.26 258.85 290.17 1986 457.65 438.20 297.13 284.50 1987 453.01 496.15 304.26 333.22 Note: The above cumulative values reflect monthly payments to beneficiaries.

Detailed Description Paragraph Table (3):
TABLE III Spanning Technology Historic Simulation Spanning Portfolio Year Return Beta Alpha 1975 28.85% 0.778 0.04% 1976 34.96 0.818 11.67 1977 -4.16 0.940 2.59 1978 4.76 0.859 -1.76 1979 21.84 0.956 3.31 1980 13.68 0.569 -8.15 1981 16.01 0.876 17.80 1982 32.60 0.829 10.39 1983 22.15 1.168 -2.03 1984 6.86 0.832 0.11 1985 40.95 1.052 6.09 1986 30.04 0.952 10.09 1987 0.87 0.887 -4.64 Electric, Gas, and Sanitation Utilities and Banking Restricted to 10% of Portfolio. Spanning S&P 500 *1975 to 1987 Results: Portfolio Index Alpha - risk adjusted 4.33% 0.00% Beta - risk adjusted 0.77 1.00 Average Return 19.2% 16.3% Correlation to Liability 69.6% 33.3% Return Volatility 13.6% 13.6% Funding Return Volatility 10.1% 15.0% Beginning Portfolio (1/75) Dividend Yield 5.53% 3.41% P/E 7.2 7.7 Ending Portfolio (1/87) Dividend Yield 5.23% 4.00% P/E 16.8 16.0 Duration of Liabilities at 9.61 yrs a 9% Interest Rate *Note: results are based on annual returns

Detailed Description Paragraph Table (4):
TABLE IV SPANNING PORTFOLIO COMPOSITION 1987 Portfolio Industry % of Portfolio Food Kindred Products 12.10 Textile Mill Products 2.57 App. & Oth. Fin. Prod. .80 Furniture and Fixtures 2.39 Printing Publishing and A.P. 2.73 Chemical and Allied Prod. 8.85 Primary Metal Industries .81 Fab. Metal Industries 1.34 Machinery Except Electrical 8.42 Ele. and Ele. Mach. 2.50 Meas. Anal. & Cont. Inst. Etc. 6.76 Transportation By Air 5.16 Communication 2.89 Electirc Gas And Sanit. Serv. 10.00 Wholesale Trade-Durable Goods .46 Wholesule Trade-Nondur. Goods 1.56 General Merch. Stores 1.88 Food Stores 3.00 Eating And Drinking Places 2.40 Banking 7.17 Cred. Agen. Oth. Than Banks 3.00 Insurance Carriers 2.36 Hold. and Other Inv. Comp. 2.90 Hotels Room. Houses Comp AOLP .17 Health Services 1.76 Miscellaneous Services 3.00 Nonclassifiable Establishments 3.00

Detailed Description Paragraph Table (7):
TABLE VII 1975 INDUSTRY WEIGHTINGS Electric, Gas and Sanitation Utilities, and Banking Restricted to 10% of Portfolio. % of Code Industry Portfolio 10 Metal Mining 5.74% 32 Bituminous Coal & Lignite Min. 3.00 13 Oil & Gas Extraction 12.48 20 Food Kindred Products 3.00 26 Paper and Allied Products 3.00 27 Printing Publishing and A.P. 3.00 29 Petroleum Refin. & Rel. Prod. 3.00 32 Stone Clay Glass & Conc. Prod. 1.63 33 Primary Metal Industries 7.92 34 Fab. Metal Prod. Ex. M.&T.E. 3.00 35 Machinery Except Electrical 6.00 36 Ele. and Ele. Mach. 3.00 37 Transportations Equipment 3.00 48 Communication 3.00 49 Electric Gas and Sanit. Serv. 10.00 54 Food Stores 3.00 60 Banking 4.41 63 Insurance Carriers 9.00 64 Ins. Agents Brok. Serv. 6.00 67 Hold. and Other Inv. Comp. 6.83 SPANNING PORTFOLIO 1/1/75 Market Capitalization (000,000) Average $1,203 High $8,393 Low $137 Shares Outstanding (000) Average 74,840 shares Dividend Yield 5.1% Price Earning Ratio 13.1x Number of Stocks 38 Turnover 1975-1976 21.3%

Detailed Description Paragraph Table (8):
TABLE VIII 1980 INDUSTRY WEIGHTINGS Electric, Gas and Sanitation Utilities, and Banking Restricted to 10% of Portfolio. % of Code Industry Portfolio 13 Oil 3.00% 20 Food Kindred Products 15.62 23 App. & Oth. Fin. Prod. 3.00 26 Paper and Allied Products 9.00 28 Chemical and Allied Prod. 15.00 30 Rubber and Misc. Plast. Prod. 3.00 32 Stone Clay Glass & Conc. Prod. 0.95 33 Primary Metal Industries 3.00 34 Fab. Metal Prod. Ex. M.&T.E. 6.00 36 Ele. and Ele. Mach. 8.05 37 Transportations Equipment 7.38 48 Communication 3.00 49 Electric Gas and Sanit. Serv. 10.00 53 General Merch. Stores 3.00 60 Banking 10.00 SPANNING PORTFOLIO 1/1/80 Market Capitalization (000,000) Average $1,790 High S13,311 Low $247 Shares Outstanding (000) Average 130,229 shares Dividend Yield 6.9% Price Earning Ratio 6.6x Number of Stocks 37 Turnover 1980-1981 30.4%

Detailed Description Paragraph Table (10):
TABLE X 1985 INDUSTRY WEIGHTINGS Electric, Gas and Sanitation Utilities, and Banking Restricted to 10% of Portfolio. % of Code Industry Portfolio 16 Const. Oth Than B.C.-G.C. 1.76% 20 Food Kindred Products 7.09 23 App. & Oth. Fin. Prod. 3.00 25 Furniture and Fixtures 2.68 27 Printing Publishing and A.P. 3.00 28 Chemical and

Allied Prod. 18.13 34 Fab. Metal Prod. Ex. M.&T.E. 0.54 35 Machinery Except Electrical 5.05 38 Meas. Anal. & Cont. Inst. Etc. 8.53 45 Transportation By Air 3.00 47 Transportation Services 0.13 48 Communication 1.22 49 Electric Gas and Sanit. Serv. 10.00 51 Wholesale Trade-Nondur. Goods 3.00 53 General Merch. Stores 3.41 58 Eating and Drinking Places 3.00 60 Banking 7.70 61 Cred. Agen. Oth. Than Banks 3.00 63 Insurance Carriers 1.54 67 Hold. And Other Inv. Comp. 3.00 73 Business Services 2.30 78 Motion Pictures 2.93 89 Miscellaneous Services 3.00 99 Nonclassifiable Establishments 3.00 SPANNING PORTFOLIO 1/1/85 Market Capitalization (000,000) Average $3,045 High $11,689 Low $373 Shares Outstanding (000) Average 97,120 shares Dividend Yield 4.0% Price Earning Ratio 11.0x Number of Stocks 41 Turnover 1985-1986 15.0%

Detailed Description Paragraph Table (11):
TABLE XI ANALYSIS OF PROGRAM SIMULATION Target & Index represent the Standard & Poors 500 Stock Index portfolio represent optimizer chosen portfolio. One example of the benefits of the technique are seen in the monthly statistics, where the annualized standard deviation of returns is 14.6% for the optimized portfolio vs. 16.04 for the S&P 500. MEAN STD DEV SKEW * 10 6 ANNUALIZED MONTHLY STATISTICS Target 15.88% 16.04% -50.00 Portfolio 17.97% 14.60% -19.72 Portfolio Diff 2.09% 4.40% .01 Index 15.88% 16.04% -50.00 Index Diff .00% .00% .00 ANNUALIZED QUARTERLY STATISTICS Target 16.18% 17.04% -172.12 Portfolio 18.40% 16.19% -41.29 Portfolio Diff 2.23% 3.99% 1.58 Index 16.18% 17.04% -172.12 Index Diff .00% .00% .00 ANNUAL STATISTICS Target 16.38% 13.63% -670.98 Portfolio 19.01% 13.43% -61.67 Portfolio Diff 2.63% 4.43% -23.31 Index 16.38% 13.63% -670.98 Index Diff .00% .00% .00

Other Reference Publication (1):
Leibowitz et al: "Portfolio Optimization with Shortfall Constraints: A Confidence-Limit Approach to Managing Downside Risk"; Financial Analysis Journal, Mar./Apr. 1989, vol. 45, No. 2, pp. 34-41 (Abstract Only).*

Other Reference Publication (4):
"Duration as a Practical Tool for Bond Management", R.W. McEnally, J. of Portfolio Management, Summer 1977.

Other Reference Publication (5):
"The Revolution in Techniques for Managing Bond Portfolios", The Institute of Chartered Financial Analysts, Copyright 1983 by the Institute of Chartered Financial Analysts, Feb. 3, 1984.

Other Reference Publication (6):
"Matched-Funding Techniques-The Dedicated Bond Portfolio in Pension Funds", M.L. Leibowitz, Salomon Brothers Inc., Bond Portfolio Analysis Group, Feb. 1985.

Other Reference Publication (8):
"Total Portfolio Duration--A New Perspective on Asset Allocation", M.L. Leibowitz, Solomon Brothers Inc., Bond Portfolio Analysis Group, Feb. 1986.

Other Reference Publication (9):
"Liability Returns--A New Perspective on Asset Allocation", M.L. Leibowitz, Solomon Brothers Inc., Bond Portfolio Analysis Group, May 1986.

Other Reference Publication (11):
"Measuring the Effective Duration of Pension Liabilities", T.C. Langetieg, L.N. Bader, M.L. Leibowitz, A. Weinberger, Salomon Brothers Inc., Bond Portfolio Analysis Group, Nov. 1986.

Other Reference Publication (12):
Volatility of Pension Expense Under FASB Statement 87, L.N. Bader, M.L. Leibowitz, Salomon Brothers Inc., Bond Portfolio Analysis Group, Dec. 1986.

Other Reference Publication (13):
"Bond Dedication Within the New Asset Allocation Framework", M.L. Leibowitz, L.N. Bader, Salomon Brothers Inc., Bond Portfolio Analysis Group, Feb. 1987.

Other Reference Publication (14):
FASB Statement No. 87: Investment Management Implications, J.A. Corkran, First Boston, Apr. 1987.

Other Reference Publication (15):
"Portfolio Optimization Within a Surplus Framework--A New Perspective on Asset Allocation", M.L. Leibowitz, R.D. Henriksson, Salomon Brothers Inc., Bond Portfolio Analysis Group, Apr. 1987.

Other Reference Publication (17):
"The Financial Executive's Guide to Pension Plans", L.N. Bader, M.L. Leibowitz, Salomon Brothers Inc., Bond Portfolio Analysis Group, May 1987.

Other Reference Publication (19):
"Reappraising the Asset Allocation Decison", M.L. Leibowitz, R.D. Arnott, L.N. Bader, R.D. Henriksson, Salomon Brothers Inc., Bond Portfolio Analysis Group, Nov. 1987.

Other Reference Publication (20):
"Modern Investment Theory", R.A. Haugen, Prentice Hall, Englewood Cliffs, N.J. 1986.

CLAIMS:

1. A computer for managing a pension plan's portfolio of assets, comprising:

computer hardware means for ascertaining a standard actuarial index in terms of characteristic future cash payments discounted to present value based on a range for at least one of discount rate values and wage inflation values;

computer hardware means for ascertaining the past behavior of current pension plan liabilities projected backwards in time;

computer hardware means for determining a particular portfolio of equity stocks having an optimized combination of risk and financial return for tracking said standard actuarial index;

said computer hardware means for determining a particular portfolio of equity stocks having:

(a) means for performing computer programming commands for selecting a starting portfolio of equity stocks;

(b) means for performing computer programming commands for making a plurality of incremental changes in weight percentages of at least some of said starting portfolio of equity stocks;

(c) means for performing computer programming commands for determining a correlation of the past behavior of said pension plan liabilities with said financial return of said incrementally changed portfolio of equity stocks over the same time period as said past pension plan liabilities; and

(d) means for performing computer programming commands for reaccessing (b) and (c) until reaching said particular portfolio of assets having said optimized correlation with said standard index.

2. Apparatus for providing an optimal portfolio of equity stocks for insurance plan management, said apparatus comprising:

computer means and memory means coupled to said computer means for storing information for use by said computer means;

said computer means having:

(a) means for ascertaining a standard actuarial index in terms of characteristic future cash payments discounted to present value based on a range for at least one of discount rate values and wage inflation values;

(b) means for ascertaining the past behavior of current pension plan liabilities projected backwards in time;

(c) means for determining a particular portfolio of equity stocks having an optimized combination of risk and financial return for tracking said standard actuarial index including:

(1) means for selecting a starting portfolio of equity stocks;

(2) means for making a plurality of incremental changes in weight percentages of at least some of said starting portfolio of equity stocks;

(3) means for determining a correlation of the past behavior of said insurance plan liabilities with said financial return of said incrementally changed portfolio of equity stocks over the same time period as said past insurance plan liabilities; and

(4) means for reaccessing (2) and (3) until reaching said particular portfolio of assets having said optimized correlation with said standard index.

3. Apparatus for providing an optimal portfolio of equity stocks for pension plan management, said apparatus comprising:

computer means for performing electrical signal processing and memory means coupled to said computer means for storing information for use by said computer means;

said computer means being programmed to generate electrical signals including:

(a) electrical signals characteristic of a standard actuarial index in terms of characteristic future cash payments discounted to present value based on a range for at least one of discount rate values and wage inflation values;

(b) electrical signals characteristic of the past behavior of current pension plan liabilities projected backwards in time;

(c) electrical signals characteristic of a particular portfolio of equity stocks having an optimized combination of risk and financial return for tracking said standard actuarial index by electrical computer control command means having:

(1) means for selecting a starting portfolio of equity stocks;

(2) means for making a plurality of incremental changes in weight percentages of at least some of said starting portfolio of equity stocks;

(3) means for determining a correlation of the past behavior of said pension plan liabilities with said financial return of said incrementally changed portfolio of equity stocks over the same time period as said past pension plan liabilities; and

(4) means for reaccessing (2) and (3) until reaching said particular portfolio of assets having said optimized correlation with said standard index, resulting in a set of electrical signals characteristic of said portfolio of assets.

4. A computer for managing an insurance plan's portfolio of assets, comprising:

computer hardware means for ascertaining a standard actuarial index in terms of characteristic future cash payments discounted to present value based on a range for at least one of discount rate values and wage inflation values;

computer hardware means for ascertaining the past behavior of current insurance plan liabilities projected backwards in time;

computer hardware means for determining a particular portfolio of equity stocks having an optimized combination of risk and financial return for tracking said standard actuarial index;

said computer hardware means for determining a particular portfolio of equity stocks by accessing electronic signal processing components having:

(a) means for performing computer programming commands for selecting a starting portfolio of equity stocks with said commands implemented through electronic signals in said computer hardware means;

(b) means for performing computer programming commands for making a plurality of incremental changes in weight percentages of at least some of said starting portfolio of equity stocks;

(c) means for performing computer programming commands for determining a correlation of the past behavior of said insurance plan liabilities with said financial return of said incrementally changed portfolio of equity stocks over the same time period as said past insurance plan liabilities; and

(d) means for performing computer programming commands for reaccessing (b) and (c) until reaching said particular portfolio of assets having said optimized correlation with said standard index.

5. A computer for managing a pension plan's portfolio of assets, comprising:

computer hardware means for numeric processing of electrical signals;

said numeric processing being performed by manipulation and recognition of said electrical signals having two voltage levels characteristic of binary computer processing;

said numeric processing of said electrical signals performed by said computer hardware means having:

(a) means for operating on input data ascertaining a standard actuarial index in terms of characteristic future cash payments discounted to present value based on a range for at least one of discount rate values and wage inflation values;

(b) means for ascertaining by use of input data the past behavior of current pension plan liabilities projected backwards in time;

(c) means for determining a particular portfolio of equity stocks having an optimized combination of risk and financial return for tracking said standard actuarial index by carrying out a computer program comprised of generating said electrical signals in said computer hardware means arising from:

(1) means for performing computer programming commands for selecting a starting portfolio of equity stocks;

(2) means for performing computer programming commands for making a plurality of incremental changes in weight percentages of at least some of said starting portfolio of equity stocks;

(3) means for performing computer programming commands for determining a correlation of the past behavior of said pension plan liabilities with said financial return of said incrementally changed portfolio of equity stocks over the same time period as said past pension plan liabilities; and

(4) means for performing computer programming commands for reaccessing (2) and (3) until reaching said particular portfolio of assets having said optimized correlation with said standard index.

6. A computer for managing an insurance plan's portfolio of assets, comprising:

computer hardware means for numeric processing;

said numeric processing being performed by manipulation and recognition of electrical signals having two voltage levels associated with binary signal processing;

said numeric processing performed by said computer hardware means having:

(a) means for generating said electrical signals to ascertain a standard actuarial index in terms of characteristic future cash payments discounted to present value based on a range for at least one of discount rate values and wage inflation values;

(b) means for generating said electrical signals to ascertain the past behavior of current insurance plan liabilities projected backwards in time;

(c) means for generating said electrical signals to determine a particular portfolio of equity stocks having an optimized combination of risk and financial return for tracking said standard actuarial index having:

(1) means for performing computer programming commands for selecting a starting portfolio of equity stocks, said commands thereby causing generation of said electrical signals in said computer hardware means;

(2) means for performing computer programming commands for making a plurality of incremental changes in weight percentages of at least some of said starting portfolio of equity stocks;

(3) means for performing computer programming commands for determining a correlation of the past behavior of said insurance plan liabilities with said financial return of said incrementally changed portfolio of equity stocks over the same time period as said past insurance plan liabilities; and

(4) means for performing computer programming commands for reaccessing (2) and (3) until reaching said particular portfolio of assets having said optimized correlation with said standard index thereby generating electrical output signals characteristic of said particular portfolio of assets.

7. A computer for managing a pension plan's portfolio of assets, comprising:

computer hardware means capable of numeric processing;

said computer hardware means including a read only memory and a random access memory;

said numeric processing involving accessing said read only memory and said random access memory, said numeric processing performed by said computer hardware means having:

(a) means for processing electrical signals in said computer hardware means to ascertain a standard actuarial index in terms of characteristic future cash payments discounted to present value based on a range for at least one of discount rate values and wage inflation values;

(b) means for processing electrical signals in said computer hardware means to ascertain the past behavior of current pension plan liabilities projected backwards in time;

(c) means for processing electrical signals in said computer hardware means to determine a particular portfolio of equity stocks having an optimized combination of risk and financial return for tracking said standard actuarial index having:

(1) means for performing computer programming commands for selecting a starting portfolio of equity stocks;

(2) means for performing computer programming commands for making a plurality of incremental changes in weight percentages of at least some of said starting portfolio of equity stocks;

(3) means for performing computer programming commands for determining a correlation of the past behavior of said pension plan liabilities with said financial return of said incrementally changed portfolio of equity stocks over the same time period as said past pension plan liabilities; and

(4) means for performing computer programming commands for reaccessing (2) and (3) until reaching said particular portfolio of assets having said optimized correlation with said standard index thereby generating said electrical signals characteristic of said particular portfolio.

8. A computer for managing an insurance plan's portfolio of assets, comprising:

computer hardware means for performing numeric processing;

said computer hardware means including a read only memory and a random access memory and further comprising:

(a) means for processing input data electronically to ascertain a standard actuarial index in terms of characteristic future cash payments discounted to present value based on a range for at least one of discount rate values and wage inflation values;

(b) means for processing input data electronically to ascertain the past behavior of current insurance plan liabilities projected backwards in time;

(c) means for processing data electronically to determine a particular portfolio of equity stocks having an optimized combination of risk and financial return for tracking said standard actuarial index;

(d) means for processing data electronically to determine said particular portfolio of equity stocks having:

(1) means for performing computer programming commands for selecting a starting

portfolio of equity stocks;

(2) means for performing computer programming commands for making a plurality of incremental changes in weight percentages of at least some of said starting portfolio of equity stocks;

(3) means for performing computer programming commands for determining a correlation of the past behavior of said insurance plan liabilities with said financial return of said incrementally changed portfolio of equity stocks over the same time period as said past insurance plan liabilities; and

(4) means for performing computer programming commands for reaccessing (2) and (3) until reaching said particular portfolio of assets having said optimized correlation with said standard index.

9. Apparatus for producing a portfolio of equity stocks for pension plan management, said apparatus comprising:

first computer means for converting analog information to electronic signals;

second computer means for manipulating said electronic signals;

memory means for storing said electronic signals coupled to said second computer means for manipulating said electronic signals;

said second computer means manipulating said electronic signals at least partly in response to:

(a) means for performing computer programming commands for ascertaining a standard actuarial index in terms of characteristic future cash payments discounted to present value based on a range for at least one of discount rate values and wage inflation values;

(b) means for performing computer programming commands for ascertaining the past behavior of current pension plan liabilities projected backwards in time;

(c) means for performing computer programming commands for determining a particular portfolio of equity stocks having an optimized combination of risk and financial return for tracking said standard actuarial index having:

(1) means for selecting a starting portfolio of equity stocks;

(2) means for making a plurality of incremental changes in weight percentages of at least some of said starting portfolio of equity stocks;

(3) means for determining a correlation of the past behavior of said pension plan liabilities with said financial return of said incrementally changed portfolio of equity stocks over the same time period as said past pension plan liabilities; and

(4) means for reaccessing (2) and (3) until reaching said particular portfolio of assets having said optimized correlation with said standard index.

10. Apparatus for producing a portfolio of equity stocks for insurance plan management, said apparatus comprising:

first computer means for converting analog information to electronic signals;

second computer means for manipulating said electronic signals;

memory means for storing said electronic signals coupled to said second computer

means for manipulating said electronic signals;

said second computer means manipulating said electronic signals at least partly in response to carrying out a program generating electrical signals from:

(a) means for performing computer programming commands for ascertaining a standard actuarial index in terms of characteristic future cash payments discounted to present value based on a range for at least one of discount rate values and wage inflation values;

(b) means for performing computer programming commands for ascertaining the past behavior of current pension plan liabilities projected backwards in time;

(c) means for performing computer programming commands for determining a particular portfolio of equity stocks having an optimized combination of risk and financial return for tracking said standard actuarial index having:

(1) means for selecting a starting portfolio of equity stocks;

(2) means for making a plurality of incremental changes in weight percentages of at least some of said starting portfolio of equity stocks;

(3) means for determining a correlation of the past behavior of said insurance plan liabilities with said financial return of said incrementally changed portfolio of equity stocks over the same time period as said past insurance plan liabilities; and

(4) means for reaccessing (2) and (3) until reaching said particular portfolio of assets having said optimized correlation with said standard index, said portfolio of assets characterized by electrical signals in said computer hardware means.

11. Apparatus for producing a portfolio of equity stocks for pension plan management, wherein said apparatus provides an electrical output signal subsequent to processing an electrical input signal, said apparatus comprising:

electrical processing means for processing the electrical input signal;

memory means for storing information relating to the electrical input signal being coupled to said processing means;

said processing of the electrical input signal by said electrical processing means being controlled in part by:

(a) means for performing computer programming commands generating electrical signals in said apparatus by ascertaining and storing in said memory means a standard actuarial index in terms of characteristic future cash payments discounted to present value based on a range for at least one of discount rate values and wage inflation values;

(b) means for performing computer programming commands generating electrical signals in said apparatus by ascertaining the past behavior of current pension plan liabilities projected backwards in time;

(c) means for performing computer programming commands generating electrical signals in said apparatus by determining a particular portfolio of equity stocks having an optimized combination of risk and financial return for tracking said standard actuarial index having:

(1) means for selecting a starting portfolio of equity stocks and storing electrical signals relating to said equity stocks in said memory means;

(2) means for making a plurality of incremental changes in weight percentages of at least some of said starting portfolio of equity stocks;

(3) means for determining a correlation of the past behavior of said pension plan liabilities with said financial return of said incrementally changed portfolio of equity stocks over the same time period as said past pension plan liabilities;

(4) means for reaccessing (2) and (3) until reaching said particular portfolio of assets having said optimized correlation with said standard index; and

(5) means for converting information relating to said portfolio of stocks to said electrical output signal in said memory means.

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L7: Entry 4 of 4 File: USPT Mar 9, 1993

DOCUMENT-IDENTIFIER: US 5193056 A
TITLE: Data processing system for hub and spoke financial services configuration

Abstract Text (1):
A data processing system is provided for monitoring and recording the information flow and data, and making all calculations, necessary for maintaining a partnership portfolio and partner fund (Hub and Spoke) financial services configuration. In particular, the data processing system makes a daily allocation of assets of two or more funds (Spokes) that are invested in a portfolio (Hub). The data processing system determines the percentage share (allocation ratio) that each fund has in the portfolio, while taking into consideration daily changes both in the value of the portfolio's investment securities and in the amount of each fund's assets. The system also calculates each fund's total investments based on the concept of a book capital account, which enables determination of a true asset value of each fund and accurate calculation of allocation ratios between the funds. The data processing system also tracks all the relevant data, determined on a daily basis for the portfolio and each fund, so that aggregate year-end data can be determined for accounting and for tax purposes for the portfolio and for each fund.

Brief Summary Text (2):
Investment vehicles such as mutual funds have certain operating costs. To name just a few expenses, every fund, including institutional funds (whose investors are financial institutions), pays an investment advisory fee to an investment adviser who invests the fund's assets, custodian fees to a custodian for the safekeeping of the fund's assets, portfolio accounting fees for the determination of the fund's asset value and income, shareholder servicing fees to various entities which provide investors with information and services regarding the fund, an audit fee to the fund's independent accountants who review the fund's financial statements, and a legal fee for counsel to represent the fund and each of its independent trustees. A retail fund (one whose investors are largely individuals) incurs the same kinds of expenses as an institutional fund, although certain expenses, such as shareholder servicing fees and distribution (12b-1) fees, will be larger for a retail fund, since individual investors need more services than do sophisticated institutional investors.

Brief Summary Text (4):
One way to achieve a large asset base is to combine assets of two or more mutual funds or other collective investment vehicles (hereafter referred to as funds). Current laws, however, place several restrictions on commingling the assets. A newly developed financial services configuration, called "Hub and Spoke" (a service mark of Signature Financial Group, Inc.), does allow for commingling the assets of two or more mutual funds. This financial services configuration involves an entity that is treated as a partnership for federal income tax purposes and that holds the investment portfolio (hereafter referred to as the partnership portfolio) and funds that invest as partners in the partnership portfolio.

Brief Summary Text (5):
Under the partnership portfolio and partner fund configuration, each of several

funds, called "Spokes" (a service mark of Signature Financial Group, Inc.), can be a mutual fund registered under the Investment Company Act of 1940 (the "1940 Act") and the Securities Act of 1933 (the "1933 Act"). In addition to mutual funds, a "Spoke" (a service mark of Signature Financial Group, Inc.) may also be a pension fund (subject to ERISA), a common trust fund (regulated by various banking regulators), an insurance company separate account, or a non-U.S. domiciled investment fund In addition, a partnership portfolio, called the "Hub" (a service mark of Signature Financial Group, Inc.), is established, and each fund is an investor in the partnership portfolio. The partnership portfolio is registered under the 1940 Act (since it is an investment company), but its shares are not registered under the 1933 Act. Individuals cannot invest directly in the partnership portfolio. Its only investors are the funds, each of which invests 100% of its assets in the portfolio.

Brief Summary Text (6):
Although the portfolio may legally be a trust or other entity, it is considered to be a partnership for tax purposes. As a partnership, it receives "flow-through" tax treatment and, so, the portfolio does not pay taxes, but rather all economic gain or loss flows through to the portfolio investors. Mutual funds must rely on qualifying for "regulated investment company" ("RIC") status under the Internal Revenue Code (the "Code") to avoid taxation. The RIC provisions of the Code generally prevent mutual funds from investing in other types of funds and impede the division of a single mutual fund into multiple mutual funds. These RIC provisions also lead to economic distortions and inequities among shareholders which will be discussed below.

Brief Summary Text (7):
With the assets of two or more funds combined in the portfolio, the economies of scale described above can be more fully realized. The assets of different types of investment vehicles may now be commingled, resulting in more efficient and effective investment management. While all funds can benefit from Hub and Spoke services, a fund with a small amount of assets, which ordinarily would not be a viable fund because it would have a prohibitively high operating expense ratio, can now be established on a cost-effective basis by investing its assets in a portfolio. Investing in a portfolio also provides the new fund with an investment history, which makes the fund more attractive to investors. Therefore, a mutual fund sponsor can more efficiently organize a new mutual fund to be offered to customer markets which previously could not be economically accessed by that sponsor.

Brief Summary Text (8):
Because the portfolio is not a mutual fund, it is not subject to certain economic distortions and inequities that are inherent to normal mutual fund investing. Consider a first fund which invests in a second mutual fund just before the second fund distributes its capital gains. The first fund realizes capital gains from this distribution, as does every shareholder of the second fund. The first fund, however, has not actually realized any gain in the value of the second fund, and so the second fund is merely returning a portion of the first fund's original investment. The first fund is required to pay tax on part of its original investment or, if it is a mutual fund, pass such tax on to its shareholders. Thus a return of investment becomes subject to tax.

Brief Summary Text (9):
Unlike a mutual fund, the portfolio makes daily allocations of income, capital gains, and expenses or investment losses, rather than actual distributions. These daily allocations, which are determined and managed by the data processing system and method disclosed herein, are based on an "allocation ratio" which is further described below. Such daily allocations avoid economic distortions and inequities by directly allocating the appropriate economic benefit and loss to each shareholder on that day. Mutual funds merely distribute income, and gain or loss,

to whatever shareholders happen to exist on an arbitrary date when a distribution is made. While such gain or loss is taken into account in between such distributions through the determination of the net asset value of the mutual fund's shares, it is the distribution of the gain or loss which creates a taxable gain or loss for a shareholder. The Hub and Spoke financial services configuration thus avoids this disadvantage by more accurately matching economic and taxable income.

Brief Summary Text (11):
Further complexities arise as the value of the portfolio assets rise and fall or as additional funds invest in the portfolio (or as existing funds withdraw their investments entirely). Additionally, as in any mutual fund complex, many Hub and Spoke structures may be administered simultaneously. A new and unique data processing system and method is necessary to enable accurate daily allocations to be made among each of the funds in a portfolio. Also, each such daily allocation is comprised of various economic components--income, gain, loss, expenses. These various components must be isolated and aggregated, on a continual basis, for both non-tax accounting purposes and, again (in separate accounts), for tax purposes.

Brief Summary Text (12):
Economic inaccuracies would appear over time if daily allocations were not made. Such inaccuracies will arise since typically a mutual fund will not actually allocate or pay out on a daily basis the economic components of the fund's economic experience for that day. Depending on a particular fund's prospectus, actual cash distributions can be made monthly, quarterly, or as otherwise so determined.

Brief Summary Text (13):
Were the partnership portfolio structured as a mutual fund, which makes distributions on a periodic basis, income earned on a given day, if not allocated on that day would result in an increase in capital value of the fund as a whole, rather than in income received by a particular investor; similarly, expenses incurred, if not allocated on that day, would result in a decrease in capital value of the fund as a whole, rather than as a decrease in income for a particular investor. The data processing system and method of the present invention will allow each fund to recognize on its balance sheet its fair share of economic benefit or loss experienced by the portfolio on that day.

Brief Summary Text (21):
A data processing system and method according to the present invention successfully determines each of these ever changing, and interrelated, accounts. By calculating the daily adjusted total investments for each fund according to the concept of a book capital account, the allocation ratios may be calculated accurately. The data processing system also determines, each day and over time, data necessary for calculating aggregate year-end income, expenses, and capital gain or loss for tax and accounting purposes.

Brief Summary Text (23):
The present invention provides a data processing system and method for monitoring and recording the information flow and data, and making all calculations, necessary for maintaining a partnership portfolio and partner fund (Hub and Spoke) financial services configuration. In particular, the data processing system provides means for a daily allocation of assets of two or more funds (Spokes) that are invested in a portfolio (Hub). The data processing system determines the percentage share (allocation ratio) that each fund has in the portfolio, while taking into consideration daily changes both in the value of the portfolio's investment securities (as determined by market prices) and in the amount of each fund's assets (as determined by daily shareholder purchases and redemptions). The system also allocates to each fund the portfolio's daily income, expenses, and net realized and unrealized gain or loss, calculating each fund's total investments based on the concept of a book capital account, thus enabling determination of a true asset value of each fund and accurate calculation of allocation ratios between the funds.

The data processing system also tracks all the relevant data, determined on a daily basis for the portfolio and each fund, so that aggregate year-end income, expenses, and capital gain or loss can be determined for accounting and for tax purposes for the portfolio and for each fund.

Detailed Description Text (2):
The present invention is directed to a data processing system and method for use in managing a partnership portfolio and partner fund (Hub and Spoke) financial services configuration. Such a data processing system is used once the Hub and Spoke configuration has been established, in which the assets of two or more funds are invested in a portfolio. FIG. 1 depicts an example of a Hub and Spoke configuration involving four different mutual funds. A portfolio (Hub) 2, which is set up as a partnership as described above, has as its partners and only investors funds (Spokes) 4, 6, 8, and 10. In the example shown, fund 4 is a load fund, fund 6 is a low-load fund, fund 8 is a no-load fund, and fund 10 is a common trust fund. Each of funds 4, 6, 8, and 10 have shareholders 5, 7, 9, and 11, respectively, with fund 10 having trusts as its shareholders 11.

Detailed Description Text (10):
Information on data disk 52 is transferred to a portfolio administrator 60. The Hub and Spoke management responsibilities of portfolio administrator 60 include issuing and maintaining software 50, periodically reviewing for errors in data submitted by portfolio/fund accountant 48, and calculating and processing data to obtain the year-end data for the portfolio and funds for tax and accounting purposes. Portfolio administrator 60 uses personal computer 44 running software 50 and capable of producing printed output 46. Typically, portfolio administrator 60 manages several separate Hub and Spoke configurations.

Detailed Description Text (14):
In addition, following completion of the daily incremental activity module (block 80), data developed in that module and from the Hub and Spoke allocation module (block 74) is automatically passed to a pre-pricing net asset value calculations module, at block 82, and the data developed in that module may be passed to general ledger 54. Once a year, a user, typically fund administrator 60, will have software 50 proceed to a calculate year-end tax data module, shown at block 86. Again, the system can produce output, at block 76, and store data, at block 78.

Detailed Description Text (16):
The system next proceeds to block 106, where the user enters a one-letter menu choice. At block 108, the system determines whether a valid menu choice was entered. If not, the system returns to block 106 for the user to enter a menu choice; if so, the system proceeds to block 110. There, the system determines whether a Hub and Spoke allocation, routine was selected by the user from the main menu. If so, the system proceeds to that routine via entry point A, shown in block 112; if not, the system proceeds to block 114. At block 114, the system determines whether a daily incremental activity routine was selected by the user. If so, the system proceeds to that routine via entry point B, shown in block 116; if not, the system proceeds to block 118. Here, the system determines whether an unrealized gain or loss activity routine was selected by the user. If so, the system proceeds to that routine via entry point C, shown in block 120; if not, the system proceeds to block 122. At that block, the system determines whether an initiate data disk routine was selected. If so, the system proceeds to that routine via entry point D, shown in block 124; if not, the system proceeds to block 126. At block 126, the system determines whether a year-end tax routine was selected. If so, the system proceeds to that routine via entry point E, shown in block 128; if not, then the user selected the choice to exit from the main menu, and the system ends operation, as shown in block 130.

Detailed Description Text (20):
Next, at block 154, the system displays the entries for the Spoke assets, and then

prompts the user to indicate whether the entries are correct, as block 156 shows. If the user indicates that the entries are not correct, the system returns to block 152 to allow the user to enter the Spoke assets data again; if the entries are correct, the system proceeds to block 158. As shown there, the system creates our files on the data disk: (1) a prior day file, which stores data for the prior day's total investments for the portfolio and each fund; (2) a current day file, which stores data for the adjusted total investments for the Hub and each Spoke and the allocation ratios (percentage each of the Spokes holds in the Hub, as determined by the book capital accounts); (3) a daily incremental activity file, which stores data for the income, expenses, and net realized gain or loss for the Hub; and (4) a tax file, which stores all daily activity data for computing aggregate year-end income expenses, and capital gain or loss for the Hub and each Spoke. The data stored for each day in the tax file includes the adjusted total investments for the Hub and Spokes; the daily incremental income, expenses, and net realized gain or loss for the Hub; the daily net unrealized gain or loss for the Hub and the Spokes; and the allocation ratios for each Spoke.

Detailed Description Text (38):
At block 334, the system stores the end of day Hub and Spoke assets by overwriting the prior day's total investments data in the prior day file with the adjusted total investments data in the current day file. At block 336, the system updates the breakage accumulation file with data regarding any fractional discrepancies that may have arisen. Next, at block 338, the system updates the year-end tax file, which involves storing in the tax file the adjusted total investments for the portfolio and each of the funds; the daily incremental income, expenses, and net realized gain or loss for the portfolio; the daily net unrealized gain or loss for the portfolio and funds; and the allocation ratios for each of the funds. The system then returns to the main menu routine via entry point M, as block 102 shows. Data may also be transferred to general ledger 54, either manually or automatically.

Detailed Description Text (39):
FIG. 11 is a flowchart for a year-end tax routine. The purpose of this routine, which implements module 86 of FIG. 5, is to process and calculate aggregate year-end data for the Hub and its Spokes for tax and accounting purposes. Starting at entry point E, shown in block 128, the system proceeds to block 342, where a submenu is displayed. The system next proceeds to block 344, where the user enters a one-letter submenu choice. At block 346, the system determines whether a valid submenu choice was entered. If not, the system returns to block 344 for the user to enter a submenu choice; if so, the system proceeds to block 348. There the system determines whether the user selected the submenu choice to exit. If so, the system returns to the main menu routine via entry point M, as shown in block 102; if not the system proceeds to the next step.

Detailed Description Text (41):
At block 356, the system retrieves the year-end tax data that the system has been storing in the tax file each day. The system then asks, at block 358, if the user wishes to print the tax data. If not, the system goes to block 362; if so, the system prints the tax data, at block 360, and then proceeds to block 362. There, the system asks whether the user wishes to modify any of the tax data. If not, the system proceeds to block 368; if so, the system goes to block 364, where the user enters changes to the tax data, then to block 366, to update the year-end tax file, and then to block 368.

Detailed Description Text (42):
As block 368 shows, the system calculates and processes the year-end tax data to determine aggregate year-end income, expenses, and capital gain or loss for the Hub and each Spoke. The results are then stored, at block 370, the results are displayed, at block 372, and printed, at block 374. The printout may be in the form of Internal Revenue Service form K-1. The system then returns to the main menu

routine, as shown at block 102.

Other Reference Publication (1):
Boston Business Journal, Nov. 11, 1991, "Signature seeks patent for mutual fund wheel", p. 6 (abstract only).

Other Reference Publication (4):
Barons, Feb. 17, 1992, Eaton, "Mutual Funds: Wheeling and Dealing", p. 39, column 3 (abstract only).

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L7: Entry 3 of 4 File: USPT Sep 30, 1997

DOCUMENT-IDENTIFIER: US 5673402 A
TITLE: Computer system for producing an illustration of an investment repaying a mortgage

Brief Summary Text (6):
A UK endowment mortgage is a balloon payment mortgage combined with an endowment life insurance contract. A UK endowment life insurance policy provides life insurance coverage and tax-free accumulation of premium dollars invested in the life insurance policy over a stipulated time period--usually between twenty and forty years. The lender and the insurance company work in concert to engineer a balloon payment mortgage linked to an endowment life insurance policy so that, at the end of the mortgage period, the cash value accumulated via the life insurance is sufficient to repay the mortgage in a single, lump-sum "balloon" repayment.

Brief Summary Text (7):
A home buyer financing the purchase of a home with a UK endowment mortgage pays no principal to the lender over the term of the mortgage. Monthly loan payments are limited to interest only. The mortgage principal is repaid separately by using the life insurance policy. This principal accumulates in an endowment life insurance policy--a universal life insurance policy with a level death benefit equal to the purchase price of the home. The premium dollars invested grow over the term of the mortgage to meet the amount of the principal borrowed to purchase the home. In the last year of the mortgage, the life insurance policy "endows," and the homeowner uses a one-time tax-free distribution from the life insurance policy to repay the mortgage.

Brief Summary Text (8):
The endowment mortgage has numerous advantages to UK borrowers and lenders. First, it is more tax-efficient for borrowers than a conventional amortization mortgage. This is because monthly payments include only interest and are therefore 100 percent tax deductible. Second, principal payments, made in the form of premium payments to the endowment policy (less the cost of mortality and insurance charges), accumulate tax free. This causes endowment policy assets to grow more rapidly, and in turn allows lenders to lower the amount of the required down payment. Third, it is a more secure lending vehicle for the lender. The lender has collateral rights to both the mortgaged property and the insurance policy. Fourth, because of the insurance component of the endowment mortgage, the homeowner has built-in security that so long as he or she maintains the mortgage payments, the survivors will inherit the mortgaged property free of the mortgage.

Brief Summary Text (9):
Subsequent generations of products have expanded on the endowment mortgage concept in the UK. Derivative versions of the product include the so-called Pension Mortgage and Personal Equity Plan (PEP) Mortgage. Both products link the UK equivalent of an Individual Retirement Account or Keough Account, term insurance, and a balloon payment mortgage. These financial products include all of the characteristics of an endowment mortgage (full deductibility of mortgage interest payments, life coverage, and tax-free accumulation of principal). The term insurance provides the life coverage component of the endowment mortgage, the Pension or PEP provides the tax-free accumulation of principal, and the balloon

payment mortgage provides fully deductible loan interest. In addition, both the PEP and Pension mortgages have the additional benefit of offering at least a partially deductible principal repayment. Both PEP and Pension contributions are tax-deductible up to certain limits.

Brief Summary Text (11):
Despite their great success in the UK, endowment type mortgages have not similarly dominated the United States residential mortgage market, apparently largely due to the different laws of each nation. In the United States, federal statutes forbid most lenders from selling life insurance. Also, most states have laws forbidding tie-in sales of mortgages. A tie-in sale occurs when a lender insists that a borrower buy a particular insurance product from a particular life insurance company. Legal impediments also exist for life insurers wishing to lend money as an inducement to sell insurance. Further, in the United States the tax treatment of life insurance is different from that in the United Kingdom. In the United States, policyowners must pay taxes on policy distributions in excess of the basis (for US tax purposes, the basis is equal to cumulative premium payments) in the contract. In the UK, distributions from endowment type insurance contracts are tax free.

Brief Summary Text (16):
Another drawback of the LLOYD approach is that it has potentially adverse tax consequences. It is unclear if the incremental interest in the LLOYD financial product is tax deductible as home mortgage interest or non-tax deductible as an insurance policy premium payment. That is, if the homeowner has taken a deduction for the incremental interest paid of $1,000 per year over the term of the mortgage, and the cost containment clause is exercised, it is not clear what the tax treatment of the rebate would be. Certainly the IRS will not permit the homeowner to take a deduction for an interest payment for money that is later rebated, and LLOYD acknowledges the possibility of a tax problem with his financial product. See Col. 16, lines 6-20.

Brief Summary Text (17):
For example, in order to buy the policy from the lender at its cost of $20,000, the LLOYD homeowner will have to pay the difference between the cost of the policy and the after-tax proceeds from the interest rebate. This amounts to about $14,000, assuming that the individual is in a 30 percent tax bracket.

Brief Summary Text (31):
Still another object of this invention is to provide a computerized insurance and mortgage illustration system capable of showing the projected annual accumulation of life insurance cash values that (under current interest and mortality charge assumptions under a given life insurance carrier's life contract and authorized projections thereof) will provide collateral for a mortgage and which will eventually pay off that mortgage with the after-tax proceeds from surrendering the insurance policy after a stipulated period.

Brief Summary Text (45):
A central processing unit in a digital computer is at the heart of the system. The central processing unit can access a database into which data is written and from which data is read. That data includes information regarding life insurance, mortgage information, actuarial information, insurance premium information, and predetermined text data for incorporation into the combined mortgage and insurance illustrations. The computer system further includes information corresponding to requirements of laws and regulations governing insurance and information on personal tax rates.

Brief Summary Text (47):
In accordance with one desirable aspect of the invention, information regarding a life to be insured and other data needed to provide illustrations of a mortgage using life insurance as collateral for that individual is keyed into the central

processing unit by a system user using a keyboard at a video display terminal. To assist the user in entering the appropriate data, a series of data comprising a "form" is displayed on the user's terminal by the central processing unit, and the user will normally proceed to enter pertinent information in the blanks provided. This information constitutes such things as the potential borrower's name and address, the amount of the mortgage requested, the amount of life insurance coverage required, the individual's personal tax rate, the number of points required by the lending institution, the individual's age, sex, and health status, and any other information necessary in providing an illustration of a mortgage using life insurance as collateral. This information is correlated via the central processing unit, resulting in the generation of premium quotation and mortgage illustration information. This information is then displayed at the user's terminal and can be printed out on the user's printer. Thus, in a matter of minutes, a prospective applicant is apprised of information pertinent to the mortgage such as (but not limited to) what the up-front payment and monthly payments would be for the mortgage if life insurance is used as collateral.

Brief Summary Text (54):
This description will focus on a preferred embodiment of the invention using as an investment a universal life insurance policy, but it is to be explicitly understood that other equivalent investments can be used as a means for repaying the mortgage, e.g., term life insurance with a zero coupon bond, IRA, Keough Account, or tax-deferred annuity, or some other (preferably tax-favored) means for producing secured revenue in conjunction with life insurance. Indeed, in another embodiment of the present invention, an investment for repaying the mortgage can be selected from any two or three of a group consisting of a life insurance policy, a security, and an annuity. Further, the mortgage repayment vehicle can comprise a plurality of these investments selected from the group.

Brief Summary Text (55):
As in the UK, a purchaser of a Ryan Mortgage will enjoy fully deductible mortgage interest payments over the life of the mortgage. Premium payments provide life insurance coverage, and tax-free growth of principal for the repayment of the mortgage.

Brief Summary Text (56):
Unlike the UK product or a conventional US mortgage, the Ryan Mortgage completely or partially replaces the traditional mortgage down payment with an insurance purchase. For example, to purchase a $262,000 home rather than pay $52,400 (20% of the home purchase price) as a down payment and borrow the remaining $209,600, the Ryan Mortgage home buyer pays $31,586 (12% of the home purchase price) to purchase a life insurance contract and borrows $262,000, the full purchase price of the home. The $31,586 life insurance investment provides paid up coverage for the remainder of the borrower's life. The policy also accumulates sufficient cash value to repay the $262,000 balloon payment mortgage loan when it comes due, for example, in thirty years. The borrower pays only monthly interest charges on the mortgage. Monthly mortgage payments do not include principal repayment. Monthly mortgage payments are one hundred percent tax deductible over the life of the mortgage. (See Specimen 2.)

Brief Summary Text (58):
The Ryan Mortgage offers the borrower at least two premium payment methods. The first is a lump-sum prepayment. With a lump-sum prepayment, the home buyer deposits an amount sufficient to pay the first scheduled premium. He or she also deposits enough money to purchase an annuity contract that will pay three annual premium payments (for example) for the second through fourth years of the life insurance contract. For example, of the $31,586 payment described above, $8,916.16 would go to pay the first scheduled premium payment and $22,669.84 would go to purchase an annuity at the date of the mortgage closing. Over the next three years, the annuity will make the premium payment of $8,916.16 on the anniversary of the mortgage

transaction. After making his or her lump-sum payment, the home buyer normally makes no further premium payments. While interest rates remain at or above the rate projected, these premium payments will be sufficient to ensure that the life insurance contract remains in force over the life of the mortgage. The premium is also large enough to assure that the policy will accumulate sufficient cash value to repay the mortgage by the end of the mortgage term. Normally, the lump-sum prepayment needed will be less than twenty percent of the purchase price of the home. (The standard down payment amount of a conventional home purchase is twenty percent of the purchase price.) Also, the after-tax monthly cost of the all-interest monthly mortgage payments will typically be less than or equal to the cost of a conventional mortgage with a similar down payment amount.

Brief Summary Text (60):
Under both premium payment plans, the borrower makes a collateral assignment of the policy to the lender or a third party endorser of the mortgage, such as a federal mortgage endorsement agency or a private mortgage insurance company. Under the terms of the collateral assignment agreement, the assignee has claim to the life insurance contract until the borrower repays the mortgage. When the borrower repays the mortgage, title to the home and the insurance policy vest in the borrower. If the borrower dies before the end of the mortgage term, the borrower's estate receives tax-free life insurance death benefit proceeds after deduction of the amount required to repay the mortgage obligation.

Brief Summary Text (62):
Alternatively, the homeowner may not want to enter another Ryan Mortgage transaction. If so, he or she can keep the policy and take advantage of the many other benefits of a permanent life insurance policy. A policyholder may use the life insurance policy as a savings vehicle, a source of additional life insurance coverage, a source of cash for other obligations, or a means of financing retirement benefits. For example, the policyholder may pay additional premiums and enjoy tax-free accumulation of the invested principal. The policyholder may elect to reduce his or her coverage and withdraw cash from the policy via partial withdrawals or policy loans. Policy distributions can be used to pay for major expenses such as a new car, a medical emergency, or college tuition payments for children. If the policyholder no longer needs life insurance coverage, the policyholder can enter into a tax-free exchange of the life insurance policy. For example, the policyholder can exchange the life insurance policy for an annuity that provides monthly income in retirement.

Brief Summary Text (63):
The Ryan Mortgage has other unique features designed to maximize benefit to the consumer and minimize the after-tax cost of financing the mortgage. The homeowner may repay the mortgage in one of at least three ways at the end of the mortgage term. First, the homeowner may surrender the life insurance contract and use the proceeds of the policy surrender to pay off the mortgage. Under US tax law, presently, the policyholder must pay taxes on the interest income accumulated over the basis in the contract in the event of policy surrender. However, the policyholder will have had the benefit of tax-deferred accumulation of interest on the principal for up to forty years. Normally, cash value accumulated by the end of the mortgage will be sufficient to both repay the mortgage and pay the taxes on interest earnings.

Brief Summary Text (65):
The advantage of a policy loan over a policy surrender has to do with the income tax effects of the two transactions. Proceeds from policy surrenders which are in excess of the basis (premiums) represent taxable income to the policyholder. On the other hand, policy loans are not taxable income to the recipient. Therefore, by using a policy loan to repay the mortgage, the homeowner can simply hold the policy until death. Using this method, the policyholder never has to pay taxes on the accumulated interest earned in the life insurance contract.

Brief Summary Text (66):
A third option may be available to the homeowner with a good credit record during the life of the mortgage. The homeowner may roll over the mortgage in the last year and hold it until death. By using life insurance policy loans at the beginning of each year to pay the annual mortgage interest, the policyholder keeps more money in the life insurance contract and maintains a higher death benefit than if the money had been used to pay off the mortgage immediately. This approach also allows the homeowner to maintain tax-deductible mortgage interest payments in retirement.

Detailed Description Text (36):
With further reference to FIG. 3, it should be noted that, in another embodiment of the present invention, the computer system is modified to accommodate other species of investment for repaying the mortgage. The modifications would include adapting FIG. 3, particularly Blocks 58, 60, and 62, to consider these additional investments. These other investments can include, for example, joint or joint and survivor life insurance, insurance (such as term insurance) in combination with an annuity or securities (for example, a zero coupon bond), an Individual Retirement Account (IRA), or a Keough Account. In the interest of brevity, this application will not delve into each of these variations on the theme of a preferably tax-exempt repayment vehicle for serving as partial down payment and the means for repaying the mortgage. A suitably skilled computer programmer would recognize from the detailed description of the logic, user screens, specimens, and text discussion herein, that the logic would simply be modified to focus on distinctive features of the other repayment vehicle(s). Thus, for example, the alternate embodiment of the computer system would be adapted to obtain data and compute information sufficient for determining how and when the repayment vehicle will pay off the mortgage. The data can be obtained, for example, in a manner parallel to that described in Insurance Premium Information 16 or via modem, for example, from a plurality of stock brokers. There would be means for generating an illustration of such an investment, along with investment implementing documentation, brokerage account applications, etc. Similarly, the logic described herein can be modified to reflect different mortgage products. These can include fixed and variable rate mortgages with negative or positive amortization. While the fixed rate mortgages would be handled by means for computing fixed rate mortgage payments, an adjustable rate mortgage would be more complicated, having a means for computing extra amortization of mortgage principal when interest rates are low, and negative amortization when interest rates are high. The cash value accumulation can be treated as an offset to negative amortization.

Detailed Description Text (39):
User Screen 3, via Block 72 in FIG. 3A-1, also asks the user to select whether the life insurance premiums are to be paid in a lump-sum prepayment, which is a single premium payment plus (at least) three premiums prepaid with the purchase of an annuity. This minimum number of premium payments is required under present law to avoid treatment of the policy as a modified endowment contract. The system automatically preselects these amounts: (1) to assure that the policy conforms to US tax regulations and avoids modified endowment contract status under IRC Section 7702A(b) (thereby assuring that the policyholder avoids costly tax penalties in the event of policy surrender); and (2) to assure that the life insurance cash value will be sufficient to provide an amount of collateral which will be acceptable to prospective lenders.

Detailed Description Text (54):
More particularly in Blocks 106 and 108, the first way the mortgage can be repaid is by surrendering the policy. In searching for this amount, the system will iteratively solve for an amount of cash value targeted in FIG. 3B-4, Block 104. This amount will repay the mortgage assuming the policyowner/borrower surrenders the policy at the end of the last year of the mortgage. To arrive at the appropriate cash value amount, the system will iteratively repeat the following six

steps until it arrives at a premium amount that will generate an after-tax cash surrender value equal to the mortgage principal:

Detailed Description Text (59):
5) Multiply the taxable gain by one minus the customer's tax rate to arrive at the customer's net after-tax gain; and

Detailed Description Text (60):
6) Add the basis back to the net after-tax gain to arrive at the after-tax cash surrender value.

Detailed Description Text (61):
For example, assume the amount of the mortgage is $262,000 and the homeowner's expected tax rate in year thirty of the mortgage is thirty-four percent. The system will iteratively solve until it arrives at a premium amount of $35,664.64 ($8,916.16 annually for four years) and a cash value amount of [($378,608.59-$35,664.64).times.(1-0.34)]+$35,664.64=$262,007.64. (Specimen 2 shows sample output for this mortgage and the LOPT=0 mortgage repayment method. Specimen 5 shows sample output for this mortgage assuming a sponsored premium payment plan and LOPT=0).

Detailed Description Text (67):
In most universal life insurance policies the loaned funds credited rate is much lower than the policy loan interest rate. This creates a negative arbitrage or "spread" between the interest earned and interest paid within the two accounts of the policy. Because of this negative spread, policy loan balances typically grow much more quickly than the policy cash value. After a few years, policy debt will exceed cash value. At this time, the policyholder must either pay additional premiums, reduce the policy loan balance, or allow the life insurance policy to lapse. Using the above example, assume the individual requesting the illustration is a male aged thirty-two at the time of the illustration. Assume further that the loaned funds credited rate is a full three percentage points less than the 9.5% policy loan rate. Here again the system will compute the policy cash value as $302,973.30 in year 30. However, by year 36 of the policy, the policy loan balance plus outstanding policy loan interest would be $451,633.35, while the policy cash value would be $440,503.71. This would force the policyholder to pay additional premium payments or allow the policy to lapse (and pay the tax consequences) in the following year.

Detailed Description Text (78):
The additional premiums paid by the borrower will also permit the home buyer to pay off the mortgage sooner, assuming the home buyer has chosen to repay the mortgage by surrendering the life insurance contract. This is because the additional premium increases the policyholder's basis, thereby reducing the amount of the cash value which must be used to pay taxes upon surrender.

Detailed Description Text (93):
An inquiry into the prospective applicant's tax status begins with Block 174. The prospective applicant's tax rate information is input directly, as indicated in User Screen 8.

Detailed Description Text (94):
The information obtained via User Screen 8 is used in estimating the amount of the tax benefit to the borrower from the deductible mortgage interest expense, which is an important consideration to anyone evaluating the monthly net after-tax cost of a home purchase. This tax rate is then stored in the Database 17 for later use in the computation of tax credits from the deductible mortgage interest expense.

Detailed Description Text (102):
The typical closing costs estimated by the system appear in one column. The user may alternatively enter the prospective applicant's estimate of those costs in a

second column or leave certain cost categories in the second column blank, or if only a grand total of all closing costs is known to the prospective applicant, the prospective applicant may choose to enter the grand total amount, which then supersedes the itemized amounts listed in the "if known" column. The user must, however, enter a separate amount for the tax escrow. In those categories where blanks remain, Block 190 provides estimates. After Block 190, the estimates will be written to the Database 17 via Block 192, and in those categories where data has been entered to fill in the blanks, the Digital Computer 8 will, for this specific illustration, replace the system's estimates with those made by the prospective applicant when writing these values to the Database 17. Likewise, if only a grand total and tax escrow amount have been entered, those amounts are written to the Database 17 superseding all of the system's estimates.

Detailed Description Text (118):
The logic then goes to the following boxes: Block 224 to update the prospective applicant data, including personal, employment, and health data; Block 226 to update the property data; Block 228 to update the tax rate data; Block 230 to update the insurance data, including the premium structure, as well as the policy selection; and Block 232 to update the mortgage data, including the loan selection and closing costs data. These Blocks 224-232 permit the user to revise selected data in Database 17. Once the menu item has been selected and the update screen has been visited, Block 234 is used to facilitate going to the appropriate screen. The screens are filled in with the old data and in Block 236 the user is allowed to change, add to, or delete from any of the existing data. Block 236 then returns to Block 222. When the user has gone through this loop as many times as necessary to update whatever screens need updating, then from Block 222, the choice of Proceed, Block 238, can be made in which the illustration process proceeds to FIG. 3B-5, which then completes the illustration.

Detailed Description Text (151):
The INSURANCE.sub.-- PACKAGE 430 entity details the insurance packages available to be chosen for an illustration--the rates, duration, etc. This list can be viewed during the illustration process. If the prospective applicant has chosen an alternative form of collateral (a zero coupon bond, for example) this collateral is detailed in the OTHER.sub.-- COLLATERAL 444 entity. The database entity is OTHER.sub.-- COLLATERAL capable of storing information regarding other types of securities, term insurance, and the type of account in which the securities are held (e.g., IRA, Keough Account, or other tax-favored account.) For an individual illustration, OTHER.sub.-- COLLATERAL 444 and INSURANCE.sub.-- PACKAGE 430 are mutually exclusive.

Detailed Description Text (159):
The OTHER.sub.-- COLLATERAL 444 entity contains data on other instruments that are used to secure a Ryan Mortgage. The OTHER.sub.-- COLLATERAL.sub.-- ID number identifies the type of investment instrument to be illustrated. Other instruments may include, for example, term insurance used in conjunction with a security, such as a zero coupon bond, or term insurance used in conjunction with a deferred annuity. Each of these instruments, like a universal life policy, may be used in place of a down payment to provide a means of accumulating the principal needed to repay the mortgage. This data base entity is also capable of storing the type of account that the security is held in. TAX.sub.-- STATUS identifies the kind of account that the investment is held in and may include information regarding a Keough Account, Individual Retirement Account, Profit Sharing Plan, 401k plan, or other tax-favored investment account. The tax status of the account in which the investment is held is important, as it dictates the amount and timing of the taxes payable on the investment's earnings. This, in turn, dictates the amount of up-front payment required for the mortgage transaction, as well as any tax escrows which may be required.

Detailed Description Text (213):

LOPT=0: This variable assumes the mortgage is to be paid off with the after-tax insurance cash surrender value after MTH months.

Detailed Description Text (241):
TAXRATE: This variable represents the prospective applicant's tax bracket. This is a user input entered in FIG. 3B-1, Block 174. The system default used in FIG. 3A-1 is 30 percent.

Detailed Description Text (271):
LSURR(n): This is the after-tax cash surrender value, at the end of month n, which is the amount the policyholder would receive if he or she were to surrender the contract and pay hiser tax obligation at the end of month n.

Detailed Description Text (272):
LSNET(n): This is the net after-tax surrender value, at the end of month n, assuming the policyholder surrenders the contract and pays off the policy loan and the tax liability at the end of month n.

Detailed Description Text (275):
For any solved policy in FIG. 3B-6, Block 130, the system must check that it conforms with regulatory limits on the size of premium for the policy cash value. The original gSP and gLP rates were approximations. The estimated guideline amounts are rates, expressed as dollars of premium divided by dollars of insurance, where the estimated GLP=gLP.times.SA, and the estimated GSP=gSP.times.SA. The system next finds the actual GLP and GSP for this policy in FIG. 3B-6, Block 128, both to report to the carrier, and to check that the illustrated policy conforms to tax rules governing insurance in FIG. 3B-6, Block 130. To do this, the system reruns the insurance LIFPAY calculation, but with a change of certain parameters and tables, and with a new target.

Detailed Description Text (290):
The technical tax rule that must be met is that the cumulative premiums paid, as of year t, are less than or equal to max(GSP.sub.a, t.times.GLP.sub.a). However, since the policies illustrated will initially require a fixed premium per year, in order to comply with other regulatory requirements previously noted, the cumulative premium paid is quickly computed by the system. If the test is met when the last premium is paid, at LNUM.sub.r, it must be met thereafter. Thus, a simpler two part test suffices: (1) if LIFPAY.sub.r .ltoreq.GLP.sub.a, the test is met. Otherwise, (2) if LNUM.sub.r .times.LIFPAY.sub.r .ltoreq.GSP.sub.a, the test is met.

Detailed Description Text (332):
APCTAX: This is the variable for the annuity initial tax charge, expressed as a percentage of annuity premium. Annuity taxes differ for each state. This variable is independent of product.

Detailed Description Text (339):
APCTOT: This is the total percentage of annuity initial expense. It reflects the carrier's charges and annuity taxes:

Detailed Description Text (343):
The applicant pays taxes on annuity interest earned received in the annual proceeds in the month the annuity payment is made. This is the beginning of the first month, in each year, starting in the second year. For tax purposes, the total income of the annuity is shown as received by the applicant in equal annual payments.

Detailed Description Text (344):
ATAX(n): This is equal to the taxes payable on the annuity interest income. It is computed as: ##EQU28##

Detailed Description Text (349):

ASURR(n): This is the after-tax surrender value, at the end of month n. Since this is the amount the policyholder's estate would receive in the event of his or her death, it is also the annuity death benefit in month n. Because the annuity is not insurance, the gain on the annuity is taxable.

Detailed Description Text (351):
ARATE(NUM): This is the gross annuity conversion rate for table-driven annuities. This number is stored exclusive of state tax, and is expressed in terms of dollars of premium per dollar of annual payment, for an annuity with NUM annual payments.

Detailed Description Text (355):
ABAL(n): This is the before-tax annuity surrender value, at the end of month n. For a table-driven annuity, this is computed as:

Detailed Description Text (387):
TAXDED.sub.t : This is the annual tax credit used by the system in computing the mortgage after-tax cost. It is computed as: ##EQU39##

Detailed Description Text (392):
As to the investment, in one case, it can be placed in a tax-favored account, such as an IRA, Keough, or 401K plan, but in another case, the investment can be held separately (i.e., in a manner that is not tax-favored).

Detailed Description Text (393):
In any of these cases, one alternative is for the investment to include a security or a security in combination with term life insurance. The security can be a zero coupon bond, such as a US Treasury Derivative or a municipal bond derivative, or the security can be a mutual fund.

Other Reference Publication (19):
Software Packages Assist Diverse Needs of Bond Portfolio Managers, Wall Street Computer Review, Jun., 1985.

CLAIMS:

5. The machine of claim 1, wherein the programmed digital electrical computer is programmed so that the amount of collateral is an initial amount of premium for a cash value life insurance policy sufficient for repaying the amount of the mortgage with after-US-tax proceeds from a surrender of the life insurance policy; and

wherein the programmed digital electrical computer is programmed so that the illustration includes the proceeds repaying the amount of the mortgage.

19. The method of claim 15, wherein the step of programming the digital electrical computer includes programming the digital electrical computer to estimate LIFPAY, representing an amount of annual premium for a life insurance policy as the investment, given LNUM, representing a number of annual insurance premiums, in testing whether LSURR(MTH)=PRIN, wherein LSURR(MTH) represents an after-US-tax cash surrender value of the life insurance policy, MTH represents the last month of the mortgage, and PRIN represents a sum borrowed.

30. The machine of claim 28, wherein the programmed digital electrical computer is programmed to electronically generate the illustration wherein the investment is in a US-tax-favored investment plan.

35. The machine of claim 28, wherein the programmed digital electrical computer is programmed to electronically generate the illustration wherein the investment is not in a US-tax-favored investment plan.

52. The machine of claim 51, wherein the programmed digital electrical computer is

programmed to electronically generate the illustration including the amount of the mortgage being repaid by after-US-tax proceeds from a surrender of the life insurance policy.

56. The machine of claim 55, wherein the programmed digital electrical computer is programmed to electronically generate the illustration including the amount of the mortgage being repaid by after-US-tax proceeds from a surrender of the life insurance policy.

60. The machine of claim 59, wherein the programmed digital electrical computer is programmed to electronically generate the illustration including the amount of the mortgage being repaid by after-US-tax proceeds from a surrender of the life insurance policy.

87. The machine of claim 82, wherein the security is at least one share in a mutual fund.

109. The machine of claim 91, wherein the programmed digital electrical computer is programmed to compute LSURR(MTH), representing an after-US-tax cash surrender value of the life insurance policy, as not less than PRIN, representing the amount of the mortgage, at MTH, representing the last month of the mortgage.

117. The machine of claim 91, wherein the programmed digital electrical computer is programmed to compute LPAY(n), representing an amount of premium for month n for the life insurance policy such that the life insurance policy illustrated is not treated as a modified endowment contract for US tax purposes.

144. The method of claim 143, wherein the step of programming includes programming the digital electrical computer to electronically generate the illustration including the amount of the mortgage being repaid by after-US-tax proceeds from a surrender of the life insurance policy.

148. The method of claim 147, wherein the step of programming includes programming the digital electrical computer to electronically generate the illustration including the amount of the mortgage being repaid by after-US-tax proceeds from a surrender of the life insurance policy.

152. The method of claim 151, wherein the step of programming includes programming the digital electrical computer to electronically generate the illustration including the amount of the mortgage being repaid by after-US-tax proceeds from a surrender of the life insurance policy.

156. The method of claim 155, wherein the step of programming includes programming the digital electrical computer to compute the Specified Amount in response to a minimum number of premium payments required by law to avoid treatment of the life insurance policy as a modified endowment contract under US tax law.

164. The method of claim 155, wherein the step of programming includes programming the digital electrical computer to estimate a tax benefit to a borrower from a deductible interest expense of the amount of the mortgage, and to electronically generate the illustration including the tax benefit.

170. The method of claim 155, wherein the step of programming includes programming the digital electrical computer to compute, and to electronically generate the illustration including, an amount of cash value for the life insurance policy sufficient to repay the amount of the mortgage with after-US-tax proceeds from a surrender of the life insurance policy.

186. The method of claim 155, wherein the step of programming includes programming the digital electrical computer to electronically generate the illustration

including a comparison of after-US-tax cost of a monthly payment for the amount of the mortgage using the life insurance policy as collateral and a conventional mortgage.

191. The method of claim 187, wherein the step of generating is carried out with the digital electrical computer being programmed to use the amount of collateral as an amount of a cash value life insurance policy sufficient for repaying the amount of the mortgage with after-US-tax proceeds from a surrender of the life insurance policy, and wherein the illustration includes the proceeds repaying the amount of the mortgage.

216. The method of claim 202, wherein the investment is a cash value life insurance policy, and wherein the step of generating is carried out with the digital electrical computer programmed to electronically generate the illustration including the amount of the mortgage being repaid by after-US-tax proceeds from a surrender of the life insurance policy.

239. The method of claim 228, wherein the step of generating is carried out with the digital electrical computer programmed for generating the illustration including a comparison of after-US-tax cost of a monthly payment for the amount of the mortgage with the investment as collateral and a conventional mortgage.

241. The method of claim 202, wherein the step of generating includes generating the illustration wherein the investment is in a US-tax-favored investment plan.

246. The method of claim 202, wherein the step of generating includes generating the illustration wherein the investment is not in a US-tax-favored investment plan.

255. The method of claim 250, wherein the step of generating includes generating the illustration including the security being as at least one share in a mutual fund.

276. The method of claim 268, wherein the step of generating is carried out with the digital electrical computer programmed to compute an after-US-tax cash surrender value of the life insurance policy for the last month of the mortgage as not less than the amount of the mortgage.

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